

capsules." We learn however from Dr. Landsborough's 'Popular History of British Zoophytes,' recently published, that two of its members are furnished with these bodies, Mrs. Gatty having detected them on *Hippothoa divaricata*, and Mr. Peach on *Hip. catenularia*. I have now to record their occurrence on *Eucratea chelata*. Some time since Mr. W. Templer informed me that he had procured this species with ovaries, and upon my expressing some doubts on the point, he kindly supplied me with the specimens from which the following description is taken. The ovaries of the *Eucratea* spring from the fore part of the cells, immediately below the opening, occupying the place of the "spinous process" mentioned in Dr. Johnston's description. They are evidently metamorphosed cells. The lower portion resembles the corresponding part of an ordinary cell; but this is surmounted by a pouch, which contains three or four somewhat circular, opaque, white gemmules (Plate VI. fig. 3).

The reproductive bodies are enclosed in an inner sac, and there is generally a quantity of granular substance in the lower portion of the ovary.

EXPLANATION OF PLATES.

PLATE V.

A. *Campanularia parvula*, natural size and magnified.

B. *Campanularia caliculata*, natural size and magnified.

PLATE VI.

Fig. 1. *Cordylophora lacustris*, with vesicle.

Fig. 2. Bud of *Cordylophora*.

Fig. 3. Two cells of *Eucratea chelata*, with ovary.

XVI.—*Observations on the Genus Schwenkia*. By JOHN MIERS, Esq., F.R.S., F.L.S.

SCHWENKIA.

THIS is a genus of considerable interest, on account of the singular structure of its corolla, which for a long while offered a question difficult of solution. It was considered by Jussieu as nearly allied to *Browallia*, the two genera being placed by him among the *Labiatae*. Linnæus, with much penetration, suggested its affinity to the *Solanaceae*, an opinion quite disregarded by succeeding botanists. By Kunth it was classed, together with *Browallia*, in the *Scrophulariaceae*. Dr. Lindley, in his 'Introd. to Bot.' p. 224, arranged it among the *Primulaceae*, because the stamens are opposite to the expanded segments of the border of the corolla. Mr. Bentham subsequently pointed out what he considered to be the true nature of those gland-like processes,

always seen between the divisions of the border, and which he showed to be the true segments, while the others were mere appendiciform expansions, and under this ingenious point of view, he was enabled to reconcile its structure with the opinions of Jussieu: following the example of Kunth, he therefore arranged both *Schwenkia* and *Browallia* in the *Scrophulariaceæ*, among his tribe of the *Salpiglossideæ* (De Cand. Prodr. x. p. 122). Martius suggested its affinity with the *Acanthaceæ*, a view not confirmed by other botanists, and quite unsupported by facts. It is now four years since I first explained in what respects this genus differs from *Browallia* and other genera of the *Salpiglossideæ* (*huj. op.* iii. 177), and I indicated the circumstances that, in my opinion, point to its nearer affinity to *Fabiana*, in the *Solanaceæ*. This genus forms one of those instances, in which it is difficult to determine, under the ordinary interpretation of the respective ordinal characters, whether it belongs to *Solanaceæ* or *Scrophulariaceæ*. In order to obviate uncertainty in similar cases, I endeavoured to show (*loc. cit.* p. 163), and again lately (*huj. vol.* p. 6), how by separating certain anomalous genera of these two orders, marked by peculiar characters, into a separate family, a prominent and unerring line of demarcation may be established between the former,—a difficulty that has hitherto puzzled every botanist. Under this test, *Schwenkia* must be referred to the *Solanaceæ*, on account of the decidedly valvate æstivation of the corolla, as I shall presently endeavour to show.

It may be urged, that in *Schwenkia* the total number of lobes in the border being generally more than five, and the suppression or diminution of some of these and of the stamens being of frequent occurrence, are features quite foreign to the *Solanaceæ*. But in *Hebecladus* and *Dunalia* we meet with five intermediate teeth between the lobes of the border, and in *Nectouxia*, an annular 10-toothed ring is placed in the mouth of the corolla, within the line of origin of the five segments, forming thus a corona, closely analogous in its nature to those more expanded petaloid segments which Mr. Bentham describes as appendiciform processes in *Schwenkia*. In this genus the stamens are always five in number, and are situated below the middle or near the base of the tube of the corolla; of these, two, or sometimes four, are antheriferous and reach the mouth of the tube, while three, two, or one, are occasionally sterile or anantherous, the filaments in such case being sometimes short and rudimentary. In many Solanaceous plants there is often a difference in the size of the stamens, and this becomes a constant feature of the section *Nycterium* of the genus *Solanum*, where three of them are always considerably larger than the two others, which are sometimes almost sterile. The suppression of some of the anthers, and of

a portion of the glandular-looking lobes (true segments) of its border in *Schwenkia*, must be considered one of those exceptional cases which are occasionally met with in a great many orders; it serves as a point of osculation between the *Solanaceæ* and *Scrophulariaceæ*, in which latter family, the want of symmetry in its parts, and a total or partial suppression of one of its stamens, form almost universal characters. On the other hand, we meet in the same family several cases where the corolla is pentamerous, and as regularly symmetrical in its parts as in *Solanaceæ*; thus in *Capraria* (*Xuaresia*, R. & P.), we find a corolla with a border of five equal lobes and five equal stamens; so also in some species of *Verbascum*, and in *Sibthorpia*, where likewise the stamens are generally five, and equal in number to the regular segments of the border, although rarely four or eight occur. In my definition of *Schwenkia*, as given below, I have modified somewhat Mr. Bentham's view of the structure of the corolla, considering the expanded segments of the border to be analogous in their nature to the corona of *Nectouxia*.

Referring to the question of æstivation, it will be seen that in the sections *Chaetochilus*, *Euschwenkia*, and *Brachyhelus*, where the segments of the corona are small, they are valvately conjoined in bud by their floccose margins into a short cone, that closes the mouth of the tube, the lobes lying over them, and pointed toward the axis: in *Brachyhelus*, these lobes, which are several times longer than the toothed segments, soon become approximated in the axis, where they are connately disposed in an erect central column, so that both lobes and segments may be said to have a valvate æstivation: in *Cestranthus* the lobes are reduced to short teeth, but the segments of the corona are of considerable length, linear and acute, and also valvately disposed in bud, into a lengthened pentangular cone, exhibiting at its basal angles the five short lobes, as so many salient erect points. In *Cardiomeria* the lobes are equally short and similarly situated, but the very broad emarginated segments have their margins valvately disposed, and they are replicated lengthways down the middle, as in *Datura*, so that the corolla appears in bud like a slender tube swollen into a pentapterous form above, and terminated by five semi-lunate wings, depressed at the point of their union in the axis, and furnished on the external angles with the five salient short erect lobes, like so many uncinatè teeth.

Besides the considerations above described, we have the evidence in the structure of the seed, that this genus must be referred to *Solanaceæ*, and not to *Scrophulariaceæ*, because the embryo, which is slightly curved, has its radicle pointed to the basal angle of the seed, and turned away from the ventral hilum, as shown by Gaërtner (De Fruct. tab. 214), while in the latter

family the radicle always points to the true point of origin of the hilum. *Schwenkia*, like *Vestia*, has a stipitate ovarium, the support being enclosed in its hypogynous disk, and the corolla also falls away by a circumscissile line above its base, forming a small cup that invests the base of the ovarium: the mode of its placentation likewise resembles that of *Fabiana*, the points of attachment of the ovules being placed in several prominent longitudinal lines; the seed in a similar manner is slightly curved and hollow on its ventral face, the hilum being seen in this hollow.

SCHWENKIA, Linn.—D.C. Prodr. x. 192.—*Chætochilus*, Vahl. Enum. i. 102.—*Mathea*, Vell. Fl. Flum. i. tab. 51—(Charact. emend.).—*Calyx* tubulosus, 5-dentatus, vel semi-5-fidus, laciniis sublinearibus, præfloratione valvatis, persistens. *Corolla* monopetala, tubo elongato cylindrico, rarius supra medium infundibuliformi, sæpissime gibbosim subinflato, ore contracto, et hinc in lobos 5 glanduliformes producto, lobis erectis, lineari-teretibus setiformibus subæqualibus, aut inæqualibus et clavatis, vel ad dentes minutos mucroniformes redactis, fauce corona limbiformi rotata 5-partita instructo, segmentis seu brevibus et dentiformibus, vel oblongis, integris, acutis, expansis, lobis multo longioribus, aut truncato-oblongis, emarginatis, bifidisve, et tunc sæpe sese longitudinaliter retroplicatis, lobis segmentisque æstivatione valvatis. *Stamina* 5 inclusa, imo vel medio tubi orta, lobis alterna, et segmentis coronæ opposita, nunc 2 superiora fertilia et faucem attingentia, quinto summo duobusque anticis brevibus, vel his tantum (summo deficiente) anantheris sterilibusve, nunc 4 fertilia, summo quinto ananthero: *antheræ* conniventes, ovatæ, cordatæ, 2-lobæ, lobis ad connectivum tenuem dorso adnatis, rima longitudinali antice dehiscentibus. *Ovarium* oblongum, disco hypogyno cupuliformi suffultum, rarius disco obsoleto stipitatum, et hinc casu corollæ circumscissæ cyatho membranaceo imo cinctum, 2-loculare, placentis crassis, carnosis, dissepimento utrinque adnatis; *ovula* plurima, in lineas longitudinaliter digesta: *stylus* filiformis, inclusus; *stigma* claviforme, pulvinatum, obsolete 2-lobum, apice umbilicatum. *Capsula* septicide 2-valvis, valvulis integris, dissepimento demum libero medio seminifero parallelis. *Semina* plurima, tetragono-oblonga, paullo curvata, *testa* scrobiculata: *embryo* intra albumen carnosum subincurvus, cotyledonibus oblongis, compressis, radícula infera tereti hilo umbilicato ventrali distante, vix latioribus et subæqualibus.—*Herbæ* suffruticesve *Americani* (*una specie etiam in Africa tropicali crescente*): folia ovata, aut lanceolata, integra, floralia decrescentia vel minuta; pedunculi

1-flori, aut simpliciter pauciflori, breves, in paniculam foliosam vel subnudam dispositi.

I have nothing to add to the excellent description and arrangement of the species, as determined by Mr. Bentham*, in D.C. Prodr. x. 193.

XVII.—*Observations on Relative Position ; including a new Arrangement of Phanerogamous Plants.* By B. CLARKE, F.L.S. &c.

[Continued from p. 90.]

PART II.

On the Position of Carpels.

As the progress of discovery shows that Jussieu's system in its primary divisions, viz. Monopetalous, Polypetalous, and Apetalous, leaves unassociated plants between which there is the closest resemblance in both structure and habit, and that in numerous instances,—it has become desirable to form primary divisions depending on different characters, but retaining as far as possible those of Jussieu as of subordinate value. How far the present attempt is successful the Tables will show, and the researches connected with the relative position of carpels to the axis will I trust prove of interest, and may also assist in determining questions of affinity which at present remain unsettled.

It being so common for the ovary to consist of two or only one carpel, in either case having a variable relation to the axis, it becomes interesting to trace the cause of this reduction, and more especially the causes of the variations in their position; and of these inquiries, the varying position of the two carpels of dicarpous ovaries affords the most satisfactory explanation. Thus, the cause of the difference of the position of the carpels when reduced to two, is explained by the mode in which the changes of position occur when a tricarpous ovary becomes dicarpous.

DIFFERENCES IN THE POSITION OF THE CARPELS WHEN TWO.

1. *When the two carpels are right and left with respect to the axis.* In the genus *Carex* the three carpels are ordinarily two of them right and left and one posterior, and when reduced to two, they are (in the species examined) uniformly right and left; in *Malpighia coccifera* the three carpels have also the same relation to the axis, the posterior one being smaller; and in *Banisteria* of the same family, the carpels when only two are right and left.

* Analytical details of the æstivation and structure of the five different sections of this genus will be given in plate 63 of the Ill. So. Amer. Plants.